



## The RCEME History Series

# The Corps of Royal Canadian Electrical and Mechanical Engineers

### An Introduction to the EME Regulations and Instructions at the Canadian War Museum

(RCEME Version)

by

Doug Knight

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This document was researched and written at the request of the Canadian War Museum. However, because of the dual interest of the CWM and RCEME, on completion of the project, two separate editable versions were created, one for the Canadian War Museum and one for the Corps of RCEME. At that time (November 2019), the text in the two versions was identical, but either party could edit their version as necessary. The two versions are differentiated in the title page and in the file name. This version is owned by RCEME, who have full editing and distribution rights.

Doug Knight, 2019

## Introduction

Starting in 1943, the technical documentation needed for the repair and maintenance of equipment in the Canadian Army was issued in the form of Electrical and Mechanical Engineering Regulations (Canada). Every major equipment had a complete set of documents that detailed every aspect of its repair. By 1945, the system had matured into an independently organized and indexed structure, which proved to be sufficiently flexible to remain in effect until the unification of the Canadian Armed Forces in 1968 - although the name of the system changed periodically. During the early 1970s, the system was gradually incorporated into the Canadian Forces Technical Order system.

The Military History Research Centre at the Canadian War Museum (CWM) has a large collection of EMERs, which is filed using the original EMER indexing system. This paper will describe the EMER system and provide an introduction for individuals searching for documentation on a specific piece of equipment. Note, however, that the EMER collection at the CWM is incomplete and, with the changes inherent in a system spanning 25 years, tracking an individual piece of equipment may require additional research.

## Terminology

As described more fully below, the overall terminology of the system changed several times. EMER was the original British designation and remained unchanged in the UK until the 1970s. The Canadian system originally used EMER (Canada), but quickly changed the name to EME Instruction (EMEI), and later it became the Canadian Army EME Manual. In this document, "EMEI" will be used as the generic Canadian term in order to differentiate the Canadian from the British system. "EMER" (Canada) will refer to the Canadian system of that name, and any reference to the British EMER system will be made clear in the context.

## A Note on Sources

The overall EMEI system structure and organization was described in EMER (Canada), General A 003, Instruction No. 1, and that document was updated on a regular basis. Unfortunately, the CWM collection does not include that original document and no copy has (as of 2018) been found elsewhere. As a result, the system description as laid out in this guide has been recreated from other documents in the collection, which means that dates may be vague, and some information may be indicated as speculative.

\*The sources that were searched in 2018 to find General A 003 included:

- The CWM library and archives.
- RCEME files at the Library and Archives (LAC), Canada. This included the general RCEME files, including the file that is titled “Secret and Confidential Subject Files, Army - War Office reports - Electrical and Mechanical Engineering Regulations, 1943-1950 (RG24, File number: 706-227-31-1, Microfilm reel number: C-8266)”. Unfortunately, this is an administrative file and does not contain the instructions themselves. Note, however, that the individual equipment files at the LAC may contain EMEI relevant to that equipment.
- The RCEME School Library and the files at 202 Workshop Depot in Montreal.

Note that there are some references on the Internet on this subject, but they deal with the British EMER system, not the Canadian EMEI system.

## Background

Until the end of the Second World War, because of the close ties between Britain and the Commonwealth, Canadian Army policy was to use British doctrine and equipment unless there was an overriding reason not to do so. This policy was tempered with the proviso that the equipment should be manufactured in Canada whenever possible. As noted in *Arms, Men and Governments: The War Policies of Canada, 1939-1945* by C.P. Stacey, this policy had been established long before the First World War and was reaffirmed at the Imperial Conference in 1926.

Before the Second World War, equipment in the British Army was maintained in a very fragmented fashion; the various Corps (infantry, cavalry, etc.) were responsible for different aspects of the repairs. This led to duplication of effort and poor use of scarce technical personnel in wartime. The British realized that the increasing quantity of technical equipment required that a single organization be responsible for the repair and maintenance of that equipment. Accordingly, the British Army formed the Corps of Royal Electrical and Mechanical Engineers (REME) in 1942.

Canada did not immediately follow the British example. However, after overcoming a fair amount of opposition from senior officers, especially in the RCOC, the Corps of Royal Canadian Electrical and Mechanical Engineers (RCEME) was formed in early 1944 to repair and maintain Canadian Army equipment. RCEME officers and technicians in the new Corps were mainly transferred from the Engineering Branch of the Royal Canadian Ordnance Corps (RCOC(E)) and from the Royal Canadian Army Service Corps (RCASC).

## The REME/RCOC(E)/RCEME Repair System

The general principles for the repair and maintenance of army equipment were established during the Second World War, and remain the same today, although the terminology has changed somewhat. From the perspective of the fighting troops, a rapid return to service of a damaged or unserviceable piece of equipment is essential. Whenever possible, the equipment should be repaired as close as possible to where it was damaged. In wartime, moving heavy equipment back to a central location for repair takes time and increases road and rail traffic, so mobile workshops accompany the forward units. However, the mobility of the workshop must be balanced with the

complexity of the required repair, which may need special tools or require a long time to carry out. Therefore, small, completely mobile units capable of carrying out quick, simple repairs operate with or immediately behind the fighting units. They are supported by workshops further to the rear, which are capable of increasingly complex repairs, but pay for that capability by reduced mobility.

In REME and the RCOC(E), and later RCEME, repairs were categorized into “Echelons” (since the Second World War, “level” has replaced “echelon”). There were four echelons, and each equipment had a document called the “Permissive Repair Schedule” that defined what repairs could be carried out at each echelon.

**First Echelon** repair was limited to servicing, minor replacements and adjustments. They were carried out by unit (battalion or regiment) technicians or by supporting RCEME personnel attached to the unit. Repairs were normally limited to those that could be carried out using simple hand tools in less than four hours.

**Second Echelon** repair consisted of the replacement of defective major assemblies (engines, transmissions, etc.) with new or reconditioned assemblies. In general, these were carried out in fully mobile workshops that had the recovery vehicles (“wreckers” or mobile cranes) and special tools needed to remove and replace the assembly. The assembly itself was not normally repaired at second echelon.

**Third Echelon** repaired assemblies that had been replaced at second line workshops. This was normally carried out by replacing defective components or sub-assemblies with new or reconditioned components. The defective components might be repaired at third echelon, providing the repair did not require special equipment. Third Echelon workshops rarely moved.

**Fourth Echelon** repairs were carried out in a base workshop and were only limited by the personnel, stores, workshop facilities, and time that could be made available.

Different documentation was needed at each level. A first echelon unit could adjust or replace a carburetor, but did not have the time or the tools necessary to replace a defective engine, let alone repair the internal components of the engine. Therefore, they had no need to carry the documentation that explained the latter procedures.

## The British Electrical and Mechanical Engineering Regulations

Before the formation of the British REME, equipment repair and maintenance documentation was in the form of hard bound pamphlets or handbooks. Periodically, the document would be amended but, being a book, amendments were either “ink amendments” or required cutting and pasting sections into the book. This was neither simple nor reliable, and quickly resulted in an unwieldy manual. Also, it ignored the structure of the repair system, which meant that every unit had to carry the complete documentation on a piece of equipment, even though they might only be interested in one aspect of the repair.

With the formation of the British REME in 1942, the technical documentation system was reorganized and standardized. Every major equipment was assigned a set of documents that detailed the repairs that were authorized at each echelon/level and the procedures and parts necessary to carry them out. The documents were issued in loose leaf format, which allowed easy reference and also easy amendment by page

replacement. They were known as the Electrical and Mechanical Engineering Regulations (EMERs).

## Canadian CALEMEI and EMERs

Canadian technical documentation generally followed the British system. Most Canadian Army equipment was either of British origin or of Canadian origin that was also used by the British (for example, Canadian Military Pattern vehicles).

On 15 September 1943, Canadian Army Routine Order No. 3621 announced that a new and comprehensive system was being developed for the dissemination of technical information covering all branches and phases of mechanical equipment. The documentation system would be called the Electrical and Mechanical Engineering Regulations (Canada), or the Canadian Army Local Electrical and Mechanical Engineering Instructions (CALEMEI), and would closely follow the system adopted by the British REME and the Canadian Army Overseas. (See "The Chronology of the Creation of the EMEI" below.) This officially converted the Canadian Army to the British EMER system.

Both EMERs and CALEMEI existed before CARO 3621 was issued. The EMERS were used by the Imperial forces (i.e. the British Commonwealth armies) and applied to the Canadian Army in Canada and abroad. CALEMEI were issued by National Defence Headquarters (NDHQ) and applied to the Canadian Army in Canada only. This is based on a statement in a memo in LAC Army microfilm reel C-8266, file 706-227-31-1, War Office reports - Electrical and Mechanical Engineering Regulations. No "official" definition has been found. From surviving CALEMEI, the two systems were similar in format and organization.

## Promulgation of Information - Canadian Army Routine Orders

Until the unification of the Canadian Armed Forces in 1968, information in the Canadian Army was circulated using routine orders. Every unit published their routine orders on a daily basis, and larger formations published routine orders on a regular basis, although less frequently. At the national level, Canadian Army Routine Orders (CAROs) were published more or less weekly. CAROs were numbered sequentially. The CWM has a complete set of CARO under the call number Ref Tech Folio UB 505 C2 A7 CWM 194x Nos. xxxx. CAROs relevant to this document have been reproduced in Annex A.

A CARO was both informative and authoritative. For example, it could describe a change in procedure, and anyone who needed to implement that procedure could quote the CARO as the authority to demand the necessary equipment. Promotions and qualifications of officers, awards of medals and decorations to all ranks, and amendments to publications were among the many topics covered in the CAROs.

In January 1946, the Canadian Army Routine Orders were renamed the Canadian Army Orders. These were organized slightly differently, but the principles remained the same.

## The Chronology of the Creation of the EMEI

The general chronology of the EMEI system is listed below. The full text of each CARO is reproduced in Annex A.

As noted above, before the creation of the EMEI system, technical information was distributed using handbooks, pamphlets, and amendments. This continued for non-technical documentation (for example, operators manuals) after the creation of the British EMERs. Additions, cancellations, and changes to all publications were announced in CAROs. The text of CARO 3279 has been included in Annex A as a sample of this type of CARO.

On 30 January 1943, CARO 2852 announced that the Directorate of Mechanical Maintenance had developed a new series of technical bulletins, called the Modification and Service Information Bulletins. These would supersede and replace the List of Changes and Service Information Bulletins that had been issued in the past although existing documentation would remain in effect until replaced. The new bulletins covered service information and modification for all armaments, fire control instruments, radio equipment, vehicles, and motorcycles.

On 15 September 1943, CARO 3621 announced that a new and comprehensive system was being developed for the dissemination of technical information covering all branches and phases of mechanical equipment. The system would be called the Electrical and Mechanical Engineering Regulations (Canada), and would closely follow that the system adopted by the British REME and the Canadian Army Overseas. The regulations would supersede, but not render obsolete, publications such as the Directorate of Mechanical Maintenance's Technical Instructions, Canadian Army Modification (CAM) and Service Information Bulletins (SIB), etc. These would ultimately be incorporated into the new system. Details of the system would be contained in the first regulation to be published, which would be EMER (Canada), General A 003, Instruction No. 1. Every three months, a complete list of all EMERs (Canada) that had been released during that period would be published in CAROs.

On 23 October 1943, CARO 3748 amended CARO 3621 to include the dissemination of all branches and phases of *electrical and mechanical equipment*.

On 4 December 1943, CARO 3877 amended CARO 3621 to note that lists of all EMERS would appear in CAROs at quarterly intervals *or more frequently as found necessary*.

On 4 December 1943, CARO 3878 was a quarterly list of amendments. The first page of the list is reproduced in Annex A as an example.

On 15 April 1944, CARO 4732 gathered up the previous CARO into a comprehensive document (note that the Corps of RCEME had been formed in February 1944). Technical documentation covering all branches and phases of the maintenance of electrical and mechanical equipment used by the Canadian Army in Canada, excluding vehicles, would be issued as "Electrical and Mechanical Engineering Regulations" (EMERs) and/or "Canadian Army Local E.M.E. Instructions" (CALEMEI). Service information and modifications affecting both "A" and "B" vehicles [armoured and soft-skinned vehicles] would continue to be covered in Canadian Army Modification and Service Information Bulletins. These documents would be the authority to implement new procedures or maintenance data and for demanding or returning stores where necessary. The new regulations could cancel or amend previous regulations.

CARO 4732 advised that the EMER/CALEMEI system had been described in EMER (Canada) General A 003, instruction No. 1, Issue 1, dated 1 August 1943, which would be rewritten as CALEMEI General A 003 - Instruction 1, Issue 1. The CAM & SIB system had been described in Bulletin A1 dated 17 November 1942. The CARO went on to detail the entitlement and issuing of the instructions (see Annex A for the complete text of the CARO). RCOC [RCEME] maintenance establishments would receive EMERs (Canada) and CALEMEI for all levels of maintenance for all the equipment serviced by them. Units of other arms of the service (for example, artillery and armoured regiments) would receive only the EMERs (Canada) that were necessary for the maintenance level they performed - normally first echelon. Summaries of all current EMERS (Canada) and CALEMEI would be issued periodically and would be notified in routine orders. CARO 4732 cancelled CAROs 2852, 3621, 3748, 3877.

Finally, on 10 February 1945, CARO 5360 brought vehicle maintenance into the Canadian EMER system. From that time forward, technical literature for all phases of the maintenance of *all* electrical and mechanical equipment within the Canadian Army in Canada would be issued as EMERs (Canada) or CALEMEI. They would be the authority for implementing new procedures, specifying maintenance data, and demanding or returning stores where necessary. They could cancel or amend, in whole or in part, any prior instructions, regulations, or orders affecting inspection, maintenance or repair of electrical and mechanical equipment. The EMER (Canada)/CALEMEI system would be detailed in CALEME Instruction General A 003, (Description) and General A 050 (Distribution) (*not found*). Summaries of all EME Regulations and CALEME Instructions issued would be notified from time to time in routine orders. CARO 5360 cancelled CARO 4732. CARO 5360 effectively created an *independent* technical documentation system for the Canadian Army.

CARO 5479 dated 22 March 1945 was the first EMER summary to be published in the CAROs. The CARO and the first page of the summary has been reproduced in Annex A.

Publication of the EMER summaries continued during 1945 in CARO 5546, 5621, 5796, 5854, 5912, 6041, 6108, 6140, 6259, 6302, 6335, 6423, 6448, 6514, 6577, 6629, 6667, 6725, 6755, 6796, 6844, 6895, and 6896.

On 1 January 1946, the Canadian Army routine Orders were renamed to the Canadian Army Orders (CAO). From an EMER viewpoint, the summaries continued, starting with CAO 14 on 2 January 1946. That particular CAO announced that CARO 6335 also applied to the Canadian Army (Reserve). This was due to a restructuring of the Canadian Army, not the EMER system. Other CAO issued in 1946 gradually applied all the later 1945 CAROs to the Canadian Army (Reserve).

## EMEI Organization and Numbering

### General Identification

Each EMEI was originally assigned a comprehensive identifier consisting of the: system name / group / section / equipment designation / part (category) / equipment version (certain equipment only) / effective date. These are further discussed below.

For example, CALEMEI Armament L353 (C.A.) Ordnance 9.2 inch Mk 10 on Mounting 9.2-inch Mk 7 Issue 1 July 1945. This was printed on each page and expanded to:

**System Name** - Canadian Army Local Electrical and Mechanical Engineering instructions,

**Armament** - Armament Group (the armament group consisted of large calibre weapons as opposed to small arms (rifles, machine guns, etc),

**L** - Section L (probably large coast defence guns),

**35** - Equipment Designation 35 (which was the 9.2-inch coast defence gun. There seems to be no logical system for the assignment of the equipment designation number),

**3** - EMEI Part 3 (Unit Repairs),

**(C.A.)** - The meaning of the (C.A.) designator has not been determined.

**/1** - (not included in the above example), a [slash/number] could indicate a distinct version or variant of the equipment. Few equipments had this entry.

**Issue 1 July 1945** - Each instruction was given an issue number and effective date. Each page was so labelled. For amending purposes, pages could be replaced individually, so an EMEI could consist of pages with different effective dates.

## System Name

The EMEI system was in effect from 1943 to 1968 (and continued until replaced by the CFTOs in the 1970s). During that time, the overall system name changed periodically as noted below. The linkage to the British EMER system was effectively discontinued at the end of the war. Thereafter, equipment designators in the Canadian Army were independently assigned, and did not necessarily match an equivalent equipment in the British Army. The Canadian EMEI system names were (as noted on documents in the collection):

- Electrical and Mechanical Engineering Regulations (Canada) - originally created about 1943.
- Canadian Army Local E.M.E. Instructions - originally created about 1943.
- Canadian Army E.M.E. Instructions - immediate postwar.
- Canadian Army EME Manual - postwar, starting probably in the mid-1950s.
- Canadian Forces EME Manual - immediate post-Unification.

After Unification, the EME Manual was incorporated into the Canadian Forces Technical Orders system, which was a unified system for all three services and incorporated a revised numbering system. However, for many existing equipments, the EME Manual identifier was ink-amended to the new CFTO number.

## Group

Canadian EMEI were divided into a number of major topics, called Groups, which indicated the general type of equipment. Even during the Second World War, Canadian

groups were similar to, but not necessarily identical to, the British system. Groups that have been identified in the Second World War CARO summaries are:

- Armament
- Engineering Equipment
- General
- Instruments and Searchlights
- Miscellaneous Equipment
- Power
- Small Arms and Machine Guns
- Vehicles
- Workshops

Group names changed over the years as equipment became obsolete, or new categories of equipment were introduced. The following list details, in alphabetical order, the groups that have appeared in the original Canadian EMERs/CALEMEI and their successors from 1943 to Unification in 1968. Note that some dates are vague, due to missing contemporary documents. The CWM has excellent documentation on the groups that existed in 1971. The Second World War groups have been deduced from the summaries in the CARO. Changes from 1945 to 1971 are probably accurate, but not necessarily confirmed.

- **Armament.** This was an original group in 1945 and applied to weapons above 20-mm calibre. In 1961, the Armament group was combined with the Small Arms group and became the Weapons group.
- **Aviation Equipment.** This was a new group created after 1957 when RCEME began repairing army aircraft. *EME Manual 1971: Part 9*.
- **Electrical.** This was probably a renaming of the Power group at an unknown date. Parts of the Electrical group were amalgamated with the Instrument group about 1966 to form the Electromechanical group. *EME Manual 1971: Part 1*.
- **Electromechanical.** This was an amalgamation of the Electrical and Instrument groups starting about 1966. It was probably triggered by the amalgamation of the RCEME Electrical and Instrument trades on 1 October 1966. Issue 1 of the Electromechanical group index is dated 1 June 1971 and replaced the EME Manual Instruments Index dated 5 December 1968. *EME Manual 1971: Part 2*.
- **Engineering Equipment.** This was an original group in 1945. *EME Manual 1971: Part 3*.
- **General.** This was an original group in 1945 and applied to topics of an organizational and administrative nature. *EME Manual 1971: Part 4*.
- **Instruments & Searchlights.** This was an original group in 1945 and applied to electrical and optical instruments and searchlights. The searchlight designation was dropped from the group at an undetermined time, probably coinciding with the elimination of the coast defence role in the Canadian Army

in 1954. The Instrument group was amalgamated with the Electrical group about 1966 to form the Electromechanical group.

- **Management.** This was probably the successor to the Workshops group at an undetermined time. *EME Manual 1971: Part 5*.
- **Miscellaneous Equipment.** This was an original group in 1945 and applied to equipment that did not fit into any other category. *EME Manual 1971: Part 6*.
- **Power.** This was an original group in 1945 and applied to power generation systems, such as electrical generators and vehicle electrical systems. It probably became the Electrical group at an undetermined time.
- **Small Arms & Machine Guns.** This was an original group in 1945 and applied to small arms and machine guns of less than 20-mm calibre. This group was combined with the Armament group in 1961 to become the Weapons group.
- **Telecommunications.** This was an original group in 1945 and applied to radios and communications equipment. It no longer existed in 1971, since the repair of communications equipment had been taken over by the Communications and Electronics Branch.
- **Vehicles.** This was an original group in 1945 and applied to all types of vehicles. This group remained unchanged in *EME Manual 1971: Part 7*.
- **Weapons.** This group was created in 1961 by the amalgamation of the Armament and Small Arms groups, coinciding with the amalgamation of the RCEME Armament and Small Arms trades. *EME Manual 1971: Part 8*.
- **Workshops.** This was an original group in 1945 and generally applied to workshop operations, and generic procedures carried out in a workshop environment. This group was probably renamed to Management at an undetermined time.

In 1971, immediately before the introduction of the CFTO system, the Canadian Forces EME Manual consisted of nine parts:

Part 1	Electrical
Part 2	Electromechanical
Part 3	Engineering Equipment
Part 4	General
Part 5	Management
Part 6	Miscellaneous Equipment
Part 7	Vehicles
Part 8	Weapons
Part 9	Aviation Equipment

## Section

The information below is sourced from the Canadian Army EME Manual, Small Arms, A 000, Allotment of Numbers, Issue 9, 12 May 1958, which is in the CWM collection.

No previous Section description has been found, but it is unlikely that significant changes took place in this part of the system structure.

Within each group, the EMEI were divided into twenty-six sections, designated from "A" to "Z". Normally, the "A" section contained general information about the EMERs in the group, including a group index (A 000) and information on amendments and changes (A 009). The rest of Section "A" included information common to all types of equipment in the group, or to a large number of equipments in the group.

In the other sections ("B" to "Z"), the first 100 numbers in each section were allotted to information common to the equipment included in the section. In the remainder of the section, a block of ten numbers was allotted to each separate equipment or group of closely related equipments. Each number in the block of ten numbers dealt with a particular category of information on the equipment.

- 0 - Data Summary,
- 1 - Operating Instructions,
- 2 - Description,
- 3 - Unit Repairs,
- 4 - Field and Base Repairs,
- 5 - Parts and Identification Lists. During the Second World War, this section may have been Preparation for Special Functions (e.g. waterproofing),
- 6 - Unassigned (spare). During the Second World War, this section may have been Maintenance Schedules,
- 7 - Modifications,
- 8 - Repair Specifications. During the Second World War, this section may have been Inspection Standards,
- 9 - Miscellaneous.

For example, for the 105-mm Howitzer, the gun was in the Weapons group, Section Q, and was assigned numbers 100 to 109 with Weapons Q 103 being the unit repair instructions of that EMEI.

In some cases, when a block of ten numbers was assigned to a group of closely-related equipments, a slash/number could be added to the instruction to differentiate between the major variants - for example Q 103/2 (this example does not exist).

As equipment entered and left service, the Sections could be regrouped. When this happened, equipment that remained in service had to be reassigned to another section, and the EMEI designation for that equipment changed. A long service equipment could have several EMEI designations during its life. For example, the 105-mm Howitzer was Armament H 100 in 1954 and had become Weapons Q 100 in 1969. All such changes were noted in the relevant issue of Section A 009 of each group. Dependence on the organization system meant that when groups were amalgamated, the disruption was significant.

Rarely, a second letter appears in the section code. For example, "FZ 256/3", which is the wartime identifier for the Canadian Wireless Set No.19 Mk 3. This indicated that the country of origin of the equipment was not the UK. Only two country codes are

known: "Y" for the United States, and "Z" for Canada. Country codes do not appear after the war.

Sample section indices for the 1971 EME Manual are reproduced in Annex B.

### Equipment Designation Numbers, Issue Dates, Amendments and Reuse

In the Canadian Army, the EMEI system lasted for almost 30 years. As equipment went out of service, the relevant EMEIs were cancelled and ordered to be destroyed. After a period of time, the equipment designation number could then be reused. This can add to confusion in an EMEI archive. Also, as noted above, equipment was transferred between sections as the sections were restructured.

EMERs were stored in rather distinctive red loose-leaf binders. The document could be amended by page replacement or by a complete reissue of the section or the entire EMER. Version control was ensured by including the date of issue on each page.

Occasionally, ink amendments were issued, but this was a relatively rare occurrence for text within the instruction. However, the EMER number changed periodically, especially if an equipment changed sections, or if the definition of the section changed, and in this case the change would probably be an ink amendment. For example, the 155-mm M2 Gun was changed from Armament J 51 to Armament R 51 sometime after 1956 and the number was ink amended, but retained the original date of issue.

### Data Summaries

About 1969, the Data Summaries of the individual equipments (Block 0 of the individual equipment number) were consolidated to provide an Equipment Data Summary Manual for each Group. The Data Summaries were renumbered into Section "Z" in each Group. The rationale for the change is unknown, but probably reflects the fact that the data summaries were used by other corps and by staff officers for purposes that were unrelated to repair and maintenance. For example, equipment dimensions and weights are necessary for logistics planning. The other users could then get easy access to the information they needed without having to sift through the entire EMEI index. The change was recorded in the routine amendments to each Group – for example, Engineer Equipment Section Z, Issue 1, 8 September 1969 listed the Engineer Equipment Data Summaries for all engineer equipment.

### Sources and Further Reading

An excellent source on the history and numbering of British EMERs on British signals equipment is the internet site: <http://royalsignals.org.uk/emers.htm>.

Johnston, Murray C. *Canada's Craftsmen at 50!: The Story of Electrical & Mechanical Engineering in the Canadian Forces*: up to and including the 50th Anniversary of the formation of the Corps of Royal Canadian Electrical and Mechanical Engineers. Borden, Ont., EME Officers' Fund, 1997.

Library and Archives Canada. Microfilm reel C-8266, file 706-227-31-1. Secret and Confidential Subject Files, Army, War Office reports, Electrical and Mechanical Engineering Regulations. This file deals mainly with distribution of the EMERs and is in very poor condition.

## Annex A - Canadian Army Routine Orders

This annex reproduces the Canadian Army Routine Orders that refer to the introduction of the EMER System into the Canadian Army during the Second World War.

### CARO No. 2852 - Modification and Service Information Bulletins

1. The Directorate of Mechanical Maintenance has developed a new series of technical bulletins which will supersede and replace, but not obsolete, the List of Changes and Service Information Bulletins issued in the past, and will be implemented forthwith.
2. These bulletins cover service information and modification of all armaments, fire control instruments, radio equipment, "A" vehicles, "B" vehicles and motorcycles.
3. A series of special binders will be issued to all units, formations and workshops, complete with indices for the proper filing of bulletins when received. Distribution will be made by District Headquarters in accordance with the instructions contained within the binders.
4. The application in the field, of the instructions contained in these bulletins, is the responsibility of all concerned.

(Effective 27th January, 1943.)

(H.Q. 38-72-408, F.D.5)

### CARO No. 3279 - Publications

*This CARO is included as an example of the notification of the issue of general publications during the Second World War.*

1. The undermentioned publications are now available for issue on demand, through the usual channels, according to the scale indicated below. "Publications—Scales of Issue for the Canadian Army, Part I" should be amended accordingly.

Signal Training Pamphlet No. 2—Part IX—1943. Aerials and Frequency Selection for Corps and Divisional Signals.

Arm Concerned—Scale "C".

Organization, Tasks and Handling of R.E.M.E. Workshop in the Field—1943.

All Arms—Scale "A".

Range Table for Q.F. 3-7-inch A.A. Guns, Marks I, II, and III (High Angle Fire) 1938 — (loose Amdts. 6, 7 & 8) Full Charge, 26/Manuals/2723—1941.

A.23 C. & A.A. Artillery Training Centre—50 copies.

S.1 Cdn. C. & A.A. Artillery School—25 copies.

Atlantic Command for Fs G.—5 copies.

Pacific Command for I's G.—5 copies.

Arm Concerned—Scale "C" A.A. Artillery Only.

2. The undermentioned publication is now available for issue on demand, through the usual channels, according to the scale indicated below.

Military Training Pamphlet No. 40—1942 (Bilingual). Anti-Tank Mines. (This pamphlet supersedes the 1940 edition.)

Arm Concerned—Scale “C (w)

Other Arms—Scale “A”.

(To be retained by All Officer Reinforcements C.A.C. Infantry (Rifle) and (M.G.) Units.)

## CARO No. 3621 - Electrical and Mechanical Engineering Regulations (Canada)

1. A new and comprehensive system is being developed for the dissemination of technical information covering all branches and phases of mechanical equipment. This system closely follows that adopted by the Royal Electrical and Mechanical Engineers (British) and the Canadian Army Overseas, and will be taken into use in Canada.
2. Details of the system will be contained in the first regulation published which will be EMER (Canada), General A 003, Instruction No. 1. This regulation will be distributed to all concerned when printed.
3. These regulations will:
  - (a) Supersede but not render obsolete the technical information disseminated by the Directorate of Mechanical Maintenance such as D.M.M. Technical Instructions; Canadian Army Modification and Service Information Bulletins, etc. These will ultimately be incorporated into the new system.
  - (b) Gradually replace the publications mentioned in (a) above.
4. R.C.O.C. units will receive those EMERs (Canada) which relate to the work they do. Units of other arms of the service will receive certain EMERs (Canada) which relate to the care and modification of the equipment they hold.
5. At quarterly intervals, a complete list of all EMERs (Canada) which have been released during that period will appear in C.A.R.Os.

(Effective 15th September, 1943.)

(H.Q. 70-48-16, F.D.1)

## CARO No. 3748 - Electrical and Mechanical Engineering Regulations (Canada)

Canadian Army Routine Order No. 3621 is hereby amended as follows:

Para. 1, line 2 for “all branches and phases of mechanical equipment” read “all branches and phases of electrical and mechanical equipment”.

(Effective 15th October, 1943)

(H.Q. 70-48-16, F.D.5)

## CARO No. 3877 - Electrical and Mechanical Engineering Regulations (Canada)

1. Canadian Army Routine Order No. 3621 is hereby amended as follows:

Para. 5 - Cancel and substitute the following:

“5. Lists of all E.M.E.R.’s. (Canada) issued will appear in C.A.R.O.’s. at quarterly intervals or more frequently as found necessary.”

(Effective 1st December, 1943.)

(H.Q. 70-48-16, F.D. 11

## CARO No. 3878 - Electrical and Mechanical Engineering Regulations (Canada)

1. With reference to Canadian Army Routine Order No. 3621, Electrical and Mechanical Engineering Regulations (Canada) relating to Armament, Instruments and Searchlights, Small Arms and Machine Guns, and Power, issued during October are listed in the Appendix to this Order.

(Effective 1st December, 1943.)

(H.Q. 70-48-16, F.D. 11)

## CARO No. 4372 - Electrical and Mechanical Engineering Regulations, Canadian Army Local E.M.E. Instructions, Canadian Army Modification and Service Information Bulletins

1. Technical Literature covering all branches and phases of the maintenance of Electrical and Mechanical equipment with the Canadian Army in Canada, excluding vehicles, is now issued as “Electrical and Mechanical Engineering Regulations” and/or “Canadian Army Local E.M.E. Instructions”.
2. Service Information and Modifications affecting both “A” and “B” vehicles will continue to be covered in “Canadian Army Modification and Service Information Bulletins”.
3. Electrical and Mechanical Engineering Regulations, Canadian Army Local E.M.E. Instructions and Canadian Army Modification and Service Information Bulletins are authority for the implementing of new procedures, maintenance data as detailed therein, and for demanding or returning stores where necessary.
4. Electrical and Mechanical Engineering Regulations, Canadian Army Local E.M.E. Instructions, Canadian Army Modification and Service Information Bulletins will cancel or amend prior instructions, regulations or orders, in whole or in, part, as detailed within the Electrical Mechanical Engineering Regulations, Canadian Army Local E.M.E. Instructions, Canadian Army Modification and Service Information Bulletins.
5. Details of the E.M.E.R./C.A.L.E.M.E.I. system are at present contained in E.M.E.R. (Canada) General A 003, instruction No. 1, Issue 1, dated 1 Aug 43. This information will be rewritten in the near future as C.A.L.E.M.E. Instruction, General A 003—Instruction 1, Issue 1.

6. Details of the C.A.M. & S.I.B. system are found in bulletin A1, dated 17 Nov 42. Further information, if as and when necessary, will be issued as an amendment to this bulletin.
7. All Electrical and Mechanical Engineering Regulations and Canadian Army Local E.M.E. Instructions are in the form of a continuous series issued in bulk quantities by N.D.H.Q. (D. of M.M.) to commands, districts and certain camp headquarters for redistribution in accordance with the distribution codes initiated by N.D.H.Q. (D. of M.M.), and subject to modification by mutual agreement between N.D.H.Q. (D. of M.M.) and the commands, districts or camp headquarters affected. RCOC maintenance establishments and personnel will receive all E.M.E.R. and C.A.L.E.M.E. Instructions which relate to the maintenance, in all echelons of the equipment serviced by them. Units and maintenance personnel of other arms of the service will receive only such issues as are necessary to enable them to carry out the phases of maintenance normally done by them. These issues in general cover only information of first echelon level. Therefore, units, etc., who may consider themselves entitled to any of these publications, not already received, will make application by letter giving supporting reasons for their request to district or equivalent headquarters who in turn will carefully check these requests with the current distribution codes and forward any suggested changes to the codes, in order to incorporate requests considered desirable, together with full explanation for the suggested changes, to N.D.H.Q. (D. of M.M.). Stationery requisitions will NOT be used when making applications for supplies of the publications referred to in this order.
8. Summaries of all E.M.E. Regulations and C.A.L.E.M.E. Instructions will be issued from time to time as a C.A.L.E.M.E. Instruction under index No. A 002 in the part concerned. Notification of the issue of these summaries will be made in R.O's. Summaries of all C.A.M. & S.I.B. will be made as heretofore in the form of an index sheet to be inserted in the front of the binder concerned.
9. In requesting missing instructions from these summaries it is pointed out, as regards E.M.E.R.s and C.A.L.E.M.E.I.s, no unit is expected to hold all instructions, since, the series covers all types of equipments, and that while the supply of future issues can be easily arranged, blanket requests for back numbers may necessitate reprinting. Application for back numbers should therefore be confined to instructions necessary to service equipment actually on unit charge and should quote correct designation and instruction number. Compliance with these instructions should be checked by District, etc., Headquarters.
10. R.O.s 2852, 3621, 3748, 3877 are hereby cancelled.

(Effective 15 April 1944.)

(H.Q. 70-48-16, F.D. 20)

## CARO No. 5360 - Electrical and Mechanical Engineering Regulations and Canadian Army Local E.M.E. Instructions

1. Technical Literature covering all phases of the maintenance of Electrical and Mechanical equipment within the Canadian Army in Canada is now issued as "Electrical and Mechanical Engineering Regulations" and/or "Canadian Army Local EME Instructions."

2. Electrical and Mechanical Engineering Regulations and Canadian Army Local EME Instructions are authority for the implementing of new procedures, maintenance data as detailed therein, and for demanding or returning stores where necessary.
3. Authority is vested in these Regulations and Instructions to cancel or amend, in whole or in part, any prior instructions, regulations, orders or text material affecting inspection, maintenance or repair of Electrical and Mechanical equipments.
4. Details of the EMER/CALEMEI system are contained in CALEMEI General A 003, (Description) and General A 050 (Distribution).
5. Summaries of all EME Regulations and CALEME Instructions issued will be notified from time to time in ROs.
6. RO 4372 is hereby cancelled.

(Effective 1st February, 1945.)

(H.Q. 70-48-16 E.D. 69)

## Annex B - Canadian Army EME Manual - Section Indices

This annex reproduces the section indices from the Canadian Army EME Manual in 1971.

### Canadian Army EME Manual Part 1 - Electrical, Issue 14, 1 June 1971

Section	Title
A	General
B	Miscellaneous electronic equipment
C	Miscellaneous electro-acoustic equipment
D	Transmitters, AM
E	Receivers, AM
F	Radio sets, AM
G	Radiac
H	Radio sets, transmitters and receivers, SSB
I	Radio sets, FM
J	Line ancillary equipment
K	Radio ancillary equipment
L	Unarmoured mobile special equipment vehicle (SEV) installations
M	Armoured mobile special equipment vehicle (SEV) installations
N	Laser equipment
O	Radar transmitter-receivers
P	Computers and accessories
Q	Guided missiles
R	Radar accessories and special units
S	Radar trainers
T	Single channel line equipment
U	Multi-channel line equipment
V	(Unallotted)
W	Miscellaneous electrical equipment
X	Miscellaneous test facilities
Y	Test equipment for measuring electrical quantities
Z	Test equipment

## Canadian Army EME Manual Part 2 - Electromechanical, Issue 1, 1 June 1971

Section	Title
A	General
B	Angle measuring instruments
C	Instrument mounts and stands
D	Compasses and compass equipment
E	Computing instruments
F	Night vision equipment
G	(Unallotted)
H	Land navigational equipment
I	Batteries and battery charging equipment
J	Generator sets
K	(Unallotted)
L	(Unallotted)
M	Distance measuring equipment
N	Survey equipment
O	(Unallotted)
P	Gun control equipment FV GCE
Q	(Unallotted)
R	Subsidiary equipment
S	Binoculars
T	Telescopes
U	Periscopes and episopes
V	(Unallotted)
W	Training equipment
X	Optical workshop apparatus and test equipment
Y	Electrical workshop apparatus and test equipment
Z	Miscellaneous equipment

## Canadian Army EME Manual Part 3 - Engineer Equipment, Issue 11, 1 December 1971

Section	Title
A	General
B	Tractors, Tracked

- C Tractors, Wheeled
- D Mounted Attachments (Special)
- E Heaters, Portable
- F Earth Moving Equipment, Graders, Scrapers and Rooters
- G Material Handling Equipment, Forklift Trucks, Warehouse Tractors
- H Excavators, Crane-Shovels, Back Hoes, Draglines, Clamshells
- I Loaders, Scoop-Type
- J Pile Drivers, Augers, Ditchers, Well-Drilling Equipment
- K Boats, Bridging Equipment, Marine Propulsion Units
- L (Unallotted)
- M Air Equipment, Steam Equipment
- N (Unallotted)
- O (Unallotted)
- P Heating, Air Conditioning Equipment and Decontamination Equipment
- Q Water Supply and Sewage Equipment
- R Snow Removal, Grass and Brush Cutting Equipment
- S Road Surface Equipment, Road Rollers, Sanders, Sweepers, Sprinklers, Spreaders, and Vibrators
- T Rock Crushing and Screening Equipment
- U Tarmac, Bitumin, and Concrete Mixers and Boilers
- V Railway Equipment
- W Servicing Check Lists
- X Power Units Used on/in Engineering Equipment
- Y (Unallotted)
- Z Data Summaries
  - Tractors, tracked Z 020 to Z 070
  - Tractors, wheeled Z 080 to Z 120
  - Graders and scrapers Z 130 to Z 190
  - Trucks, forklift Z 200 to Z 260
  - Tractors, warehouse Z 270 to Z 280
  - Cranes, lifting, warehouse Z 290 to Z 300
  - Excavators, crane-shovels, back hoes, draglines, and clamshells Z 310 to Z 370
  - Loaders, scoop-type Z 380 to Z 440

Pile drivers, ditchers, well-drilling equipment, & air compressors Z 450 to Z 480

Road and runway surface equipment Z 490 to Z 530

Rock crushing and screening equipment Z 540 to Z 570

Hoists and conveyors Z 580 to Z 610

Power units used on/in engineering equipment Z 620 to Z 650

Mounted attachments (special) Z 660 to Z 690

Snow removal equipment Z 700 to Z 840

Railway equipment Z 850 to Z 860

Miscellaneous equipment Z 870 to Z 890

## Canadian Army EME Manual Part 4 - General, Issue 9, 10 June 1969

Section	Title
A	General
B	Constitution and Functions
C	Organization
D	Duties
E	Administration
F	Training and Trade Testing
G	Operations
H	Procedures
I	(Unallotted)
J	Accounting
K	Production
L	Finances
M	Materiels
N	Tools
O	Accommodation
P	Process Investigation
Q	(Unallotted)
R	References
S	Scaling
T	Data
U	(Unallotted)
V	Safety

W	(Unallotted)
X	(Unallotted)
Y	(Unallotted)
Z	(Unallotted)

## Canadian Army EME Manual Part 5 - Management, Issue 6, 1 May 1971

Section	Title
A	General
B	Constitution and Functions
C	Organization
D	Duties
E	Administration
F	Training and Trade Testing
G	Operations
H	Procedures
I	(Unallotted)
J	Accounting
K	Production
L	Finances
M	Materials
N	Tools
O	Accommodation
P	Process Investigation
Q	(Unallotted)
R	References
S	Scaling
T	Data
U	(Unallotted)
V	Safety
W	(Unallotted)
X	(Unallotted)
Y	(Unallotted)
Z	(Unallotted)

## Canadian Army EME Manual Part 7 - Vehicles, Issue 19, 1 December 1971

Section	Title
A	General
B	Motorcycles and Bicycles
C	General Motors Vehicles
D	Chrysler Vehicles
E	Willys Vehicles
F	Ford Vehicles
G	Miscellaneous Vehicles - Diamond T, Mack, FWD
H	Miscellaneous Vehicles (continued) - International Leyland, Federal, Western Flyer, Courier
I	Trucks, Fire Equipment
J	SP Mounts, Tanks, Medium, Centurion and ARV
K	SP Mounts, M109 and Recovery Vehicle M578
L	Carriers
M	(Unallotted)
N	Armoured Wheeled Vehicles
O	Over-snow Vehicles
P	(Unallotted)
Q	Half-Tracked Vehicles
R	(Unallotted)
S	(Unallotted)
T	Trailers
U	Bodies (Armoured and Unarmoured)
V	(Unallotted)
W	(Unallotted)
X	Engines
Y	Special Tools and Test Equipment
Z	Data Summaries
	Trucks, Military Pattern 1/2 and 3/4 ton Z 320 to Z 350
	Trucks, Military Pattern, 2-1/2 ton Z 360 to Z 390
	Trucks, Military Pattern, 3 and 4 ton Z 400 to Z 410
	Trucks, Military Pattern, 5 ton Z 420 to Z 440
	Trucks, Military Pattern, over 5 ton Z 450 to Z 490

Over-snow, SP Vehicles Z 500 to Z 540  
Trailers, Stake, Tracked Z 550  
Cars, Armoured Z 650 to Z 690  
Carriers, Armoured, Full Tracked, M113A1 family Z 700 to Z 47  
Tanks, Medium Z 720  
Tank Conversion Z 770  
Engines Z 900

## Canadian Army EME Manual Part 8 - Weapons, Issue 4, 1 May 1971

Section	Title
A	General
B	Pistols
C	Rifles
D	Carbines
E	Machine Guns Under .50 in Calibre
F	Machine Guns .50 in Calibre (or over)
G	Recoilless Rifles
H	Flame Throwers
I	Mountings
J	Mortars
K	Shotguns
L	Launchers Rocket
M	Missiles
N	(Unallotted)
O	(Unallotted)
P	(Unallotted)
Q	105 MM Equipment
R	155 MM Equipment
S	20 PR Tank Equipment
T	(Unallotted)
U	105 MM Tank Equipment
V	Smoke Dischargers
W	Scales Weighing
X	Tools and Accessories

Y (Unallotted)  
Z (Unallotted)

## Canadian Army EME Manual Part 9 - Aviation Equipment

TBS

### Small Arms, Issue 9, 12 May 1958

Section	Subjects Covered By Part
A	General
B	Pistols
C	Rifles
D	Carbines
E	Machine guns under 0.50-in cal
F	Machine guns 0.50-in cal and over
G	Recoilless rifles
H	Flame throwers
I	Spare
J	Spare
K	Spare
L	Spare
M	Mountings
N	Spare
O	Spare
P	Spare
Q	Spare
R	Mortars
S	Shotguns
T	Launchers rocket
U	Spare
V	Smoke dischargers
W	Scales weighing
X	Tools accessories
Y	
Z	Spare